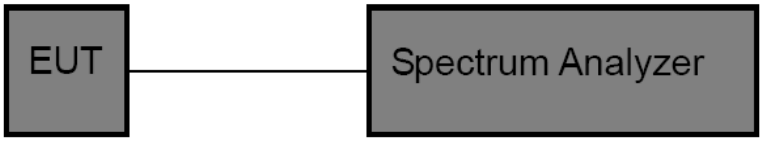
3.5. 20dB Bandwidth

Limit

N/A

Test Configuration



Test Procedure

5. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
6. OCB and 20dB Spectrum Setting:
   (1) Set RBW = 1% ~ 5% occupied bandwidth.
   (2) Set the video bandwidth (VBW) ≥ 3 RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

Note: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

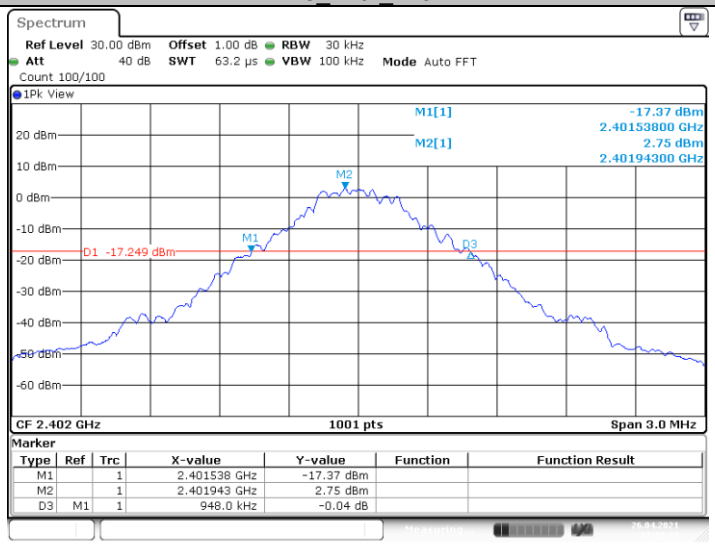
Test Mode

Please refer to the clause 2.4.

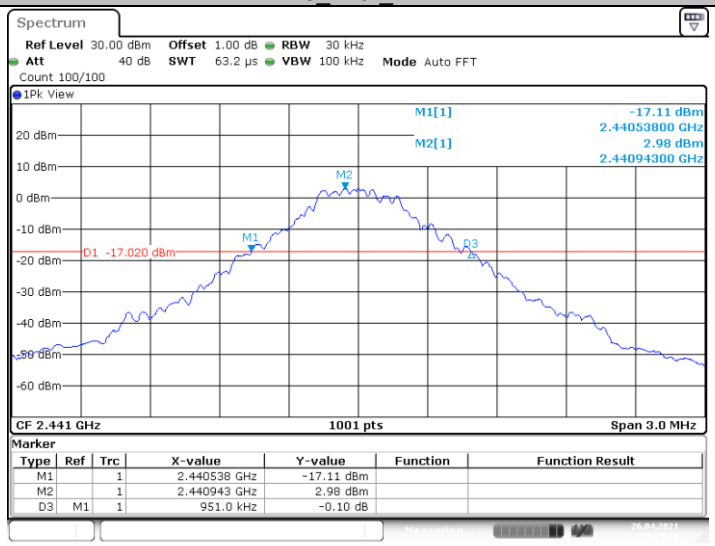
Test Result

Test Mode	Frequency (MHz)	20dB EBW[MHz]	FL[MHz]	FH[MHz]	20dB Bandwidth *2/3 (kHz)	Verdict
GFSK	2402	0.948	2401.538	2402.486	632.00	PASS
	2441	0.951	2440.538	2441.489	634.00	PASS
	2480	0.990	2479.502	2480.492	660.00	PASS
π /4-DQPSK	2402	1.272	2401.376	2402.648	848.00	PASS
	2441	1.272	2440.376	2441.648	848.00	PASS
	2480	1.275	2479.376	2480.651	850.00	PASS
8-DPSK	2402	1.275	2401.364	2402.639	850.00	PASS
	2441	1.269	2440.367	2441.636	846.00	PASS
	2480	1.269	2479.367	2480.636	846.00	PASS

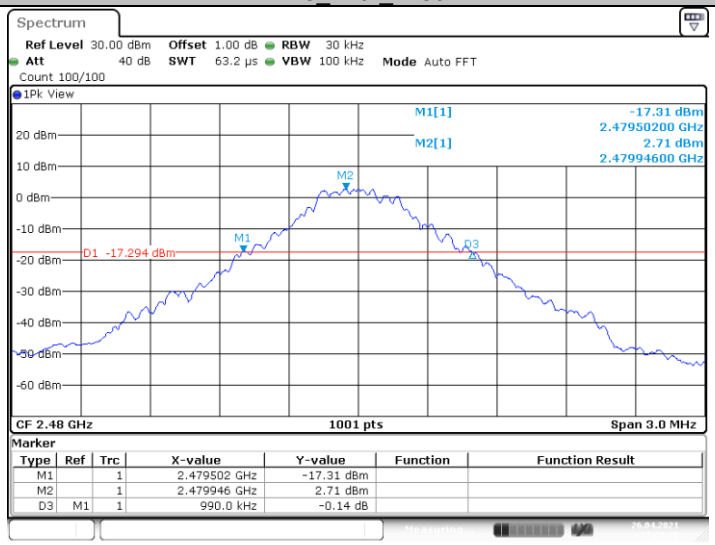
DH5_Ant1_2402



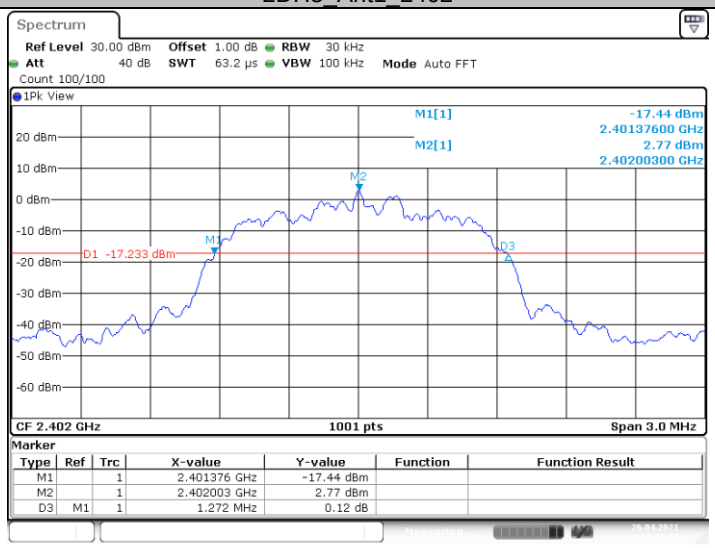
DH5_Ant1_2441



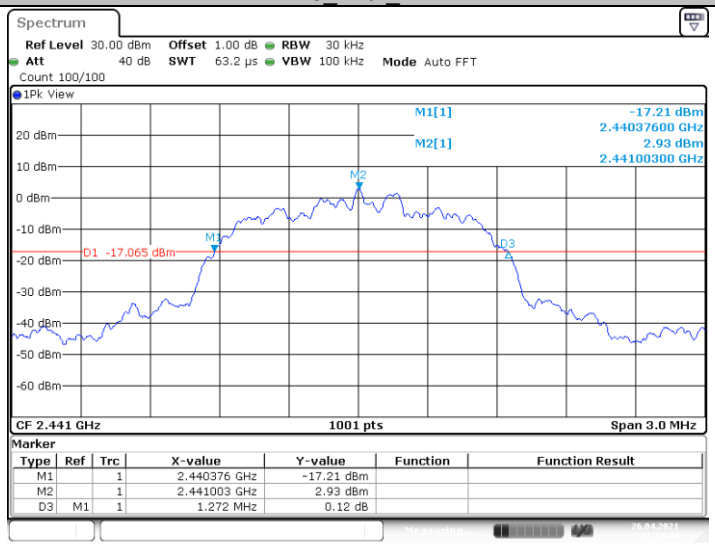
DH5_Ant1_2480



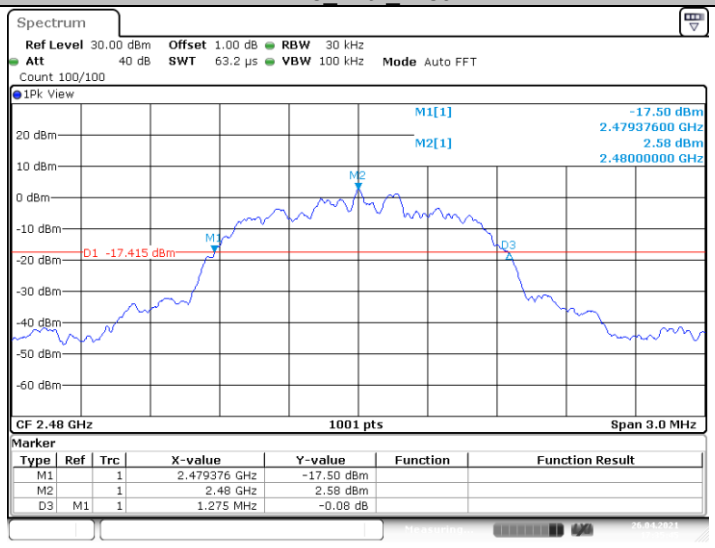
2DH5_Ant1_2402



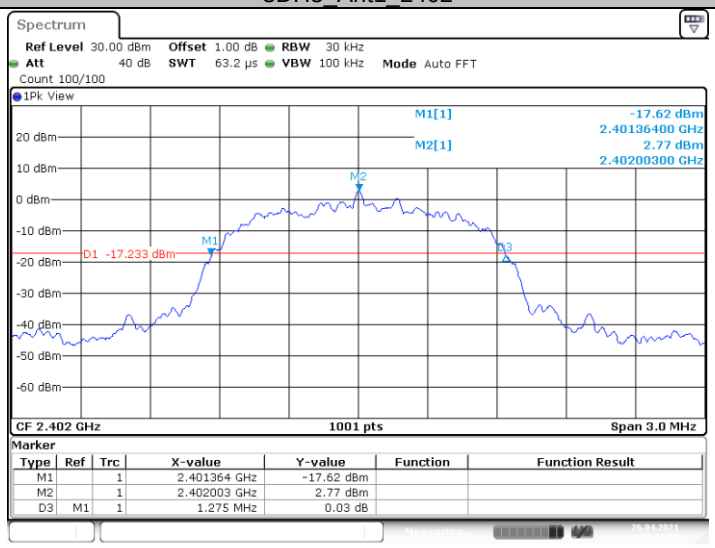
2DH5_Ant1_2441



2DH5_Ant1_2480

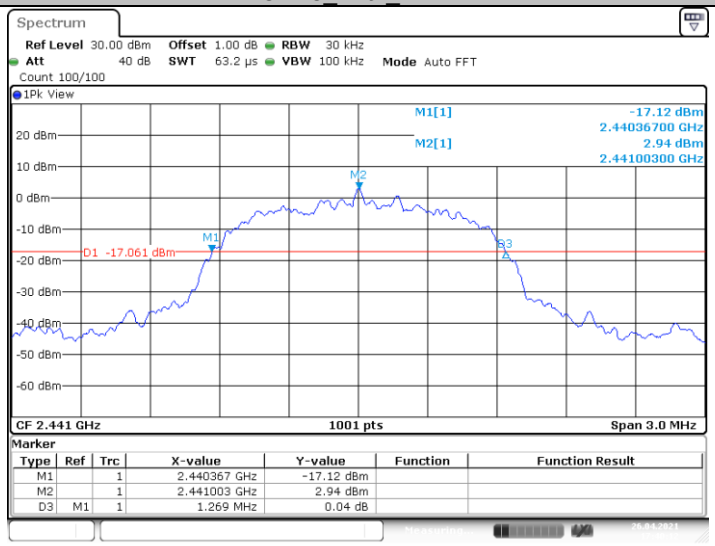


3DH5_Ant1_2402



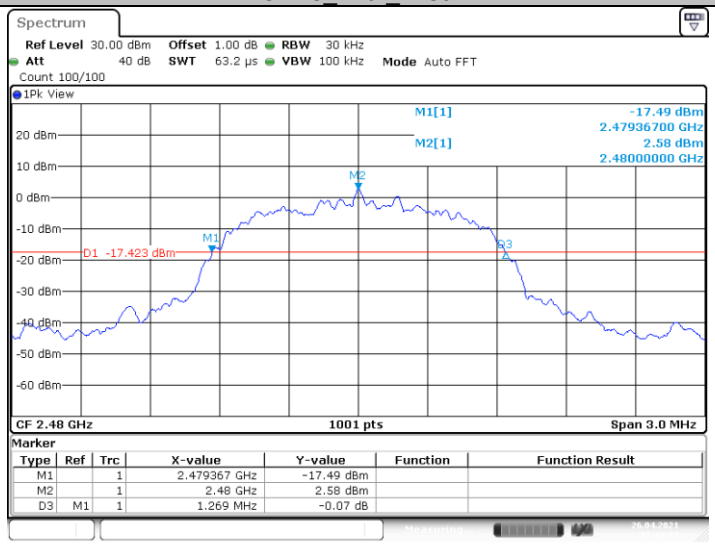
Date: 26.APR.2021 17:37:56

3DH5_Ant1_2441



Date: 26.APR.2021 17:40:12

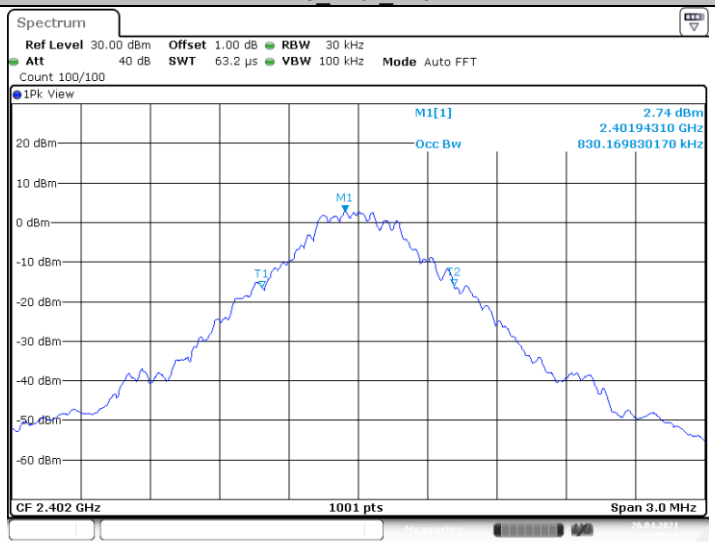
3DH5_Ant1_2480



Date: 26.APR.2021 17:42:22

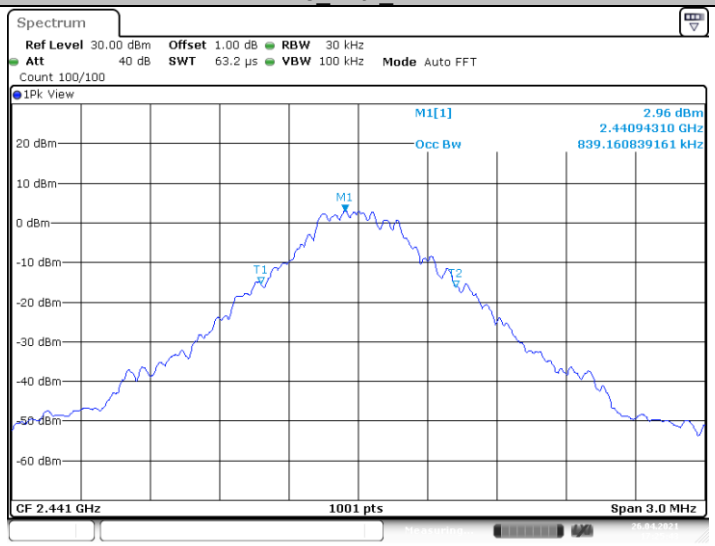
Test Mode	Frequency (MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
GFSK	2402	0.830	2401.583	2402.414	PASS
	2441	0.839	2440.580	2441.420	PASS
	2480	0.851	2479.571	2480.423	PASS
π /4-DQPSK	2402	1.151	2401.425	2402.575	PASS
	2441	1.151	2440.425	2441.575	PASS
	2480	1.154	2479.425	2480.578	PASS
8-DPSK	2402	1.157	2401.428	2402.584	PASS
	2441	1.160	2440.428	2441.587	PASS
	2480	1.157	2479.428	2480.584	PASS

DH5_Ant1_2402



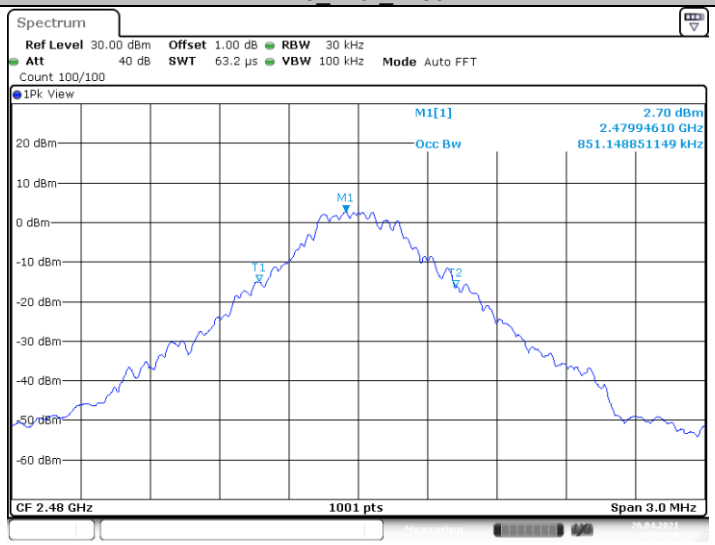
Date: 26.APR.2021 17:22:27

DH5_Ant1_2441



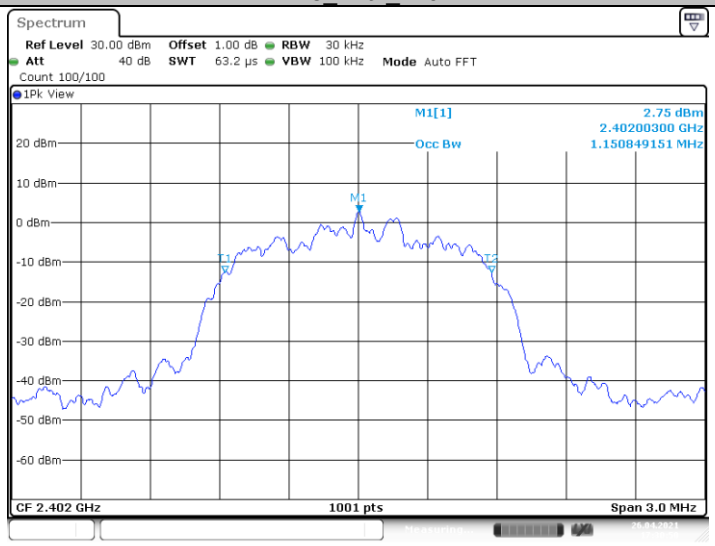
Date: 26.APR.2021 17:25:42

DH5_Ant1_2480



Date: 26.APR.2021 17:28:39

2DH5_Ant1_2402

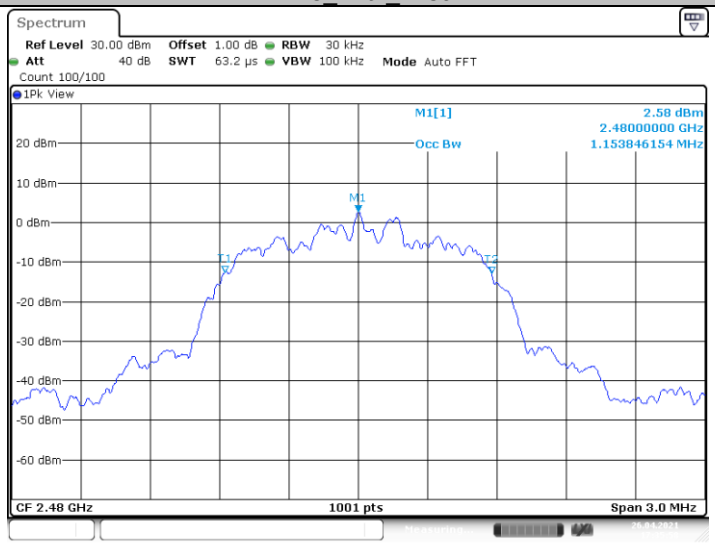


Date: 26.APR.2021 17:30:50

2DH5_Ant1_2441

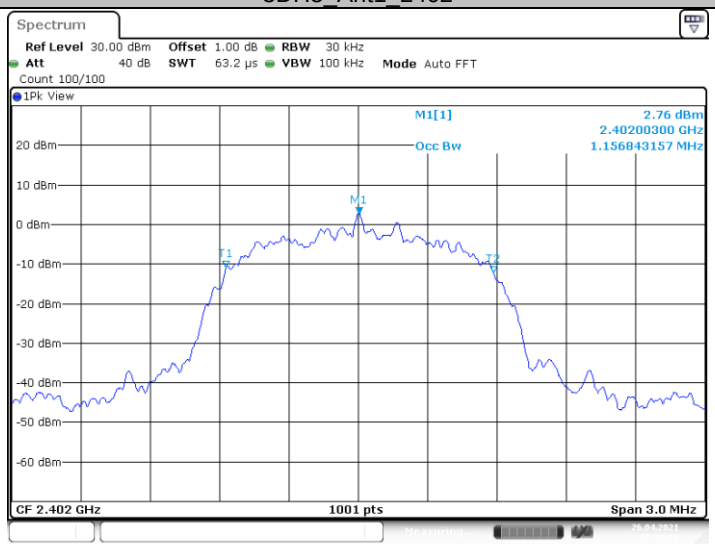
Date: 26.APR.2021 17:34:00

2DH5_Ant1_2480



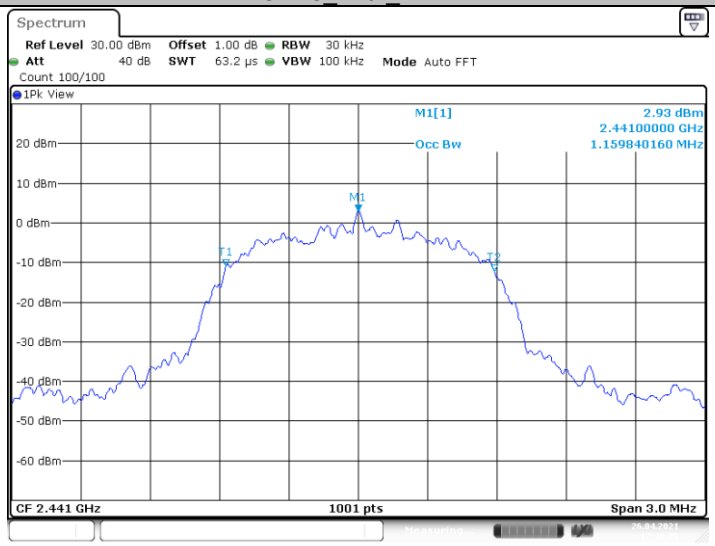
Date: 26.APR.2021 17:35:57

3DH5_Ant1_2402



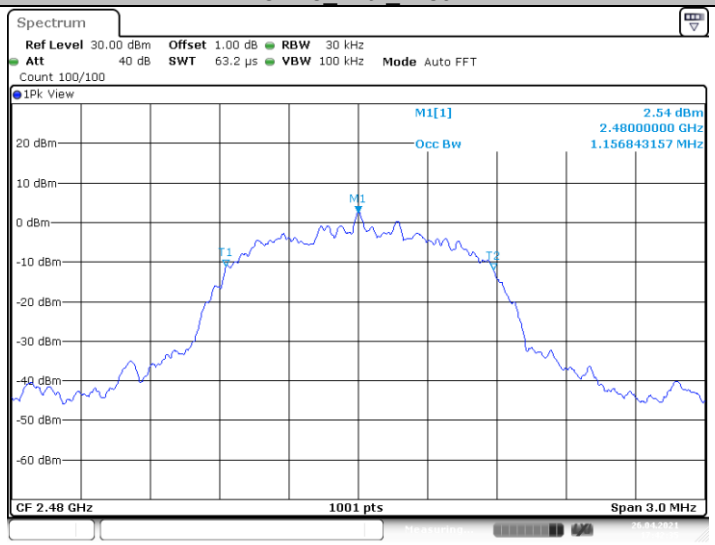
Date: 26.APR.2021 17:38:09

3DH5_Ant1_2441



Date: 26.APR.2021 17:40:25

3DH5_Ant1_2480



Date: 26.APR.2021 17:42:35

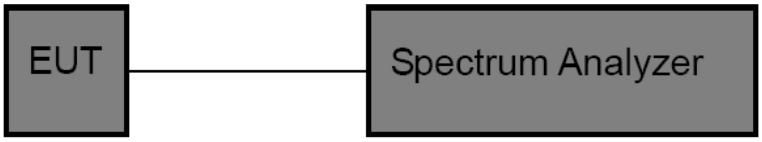
3.6. Channel Separation

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1)/ RSS-247 5.1 b :

Test Item	Limit	Frequency Range(MHz)
Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5

Test Configuration



Test Procedure

7. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
8. Spectrum Setting:
   (1) Set RBW = 100 kHz.
   (2) Set the video bandwidth (VBW) ≥ 3 RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

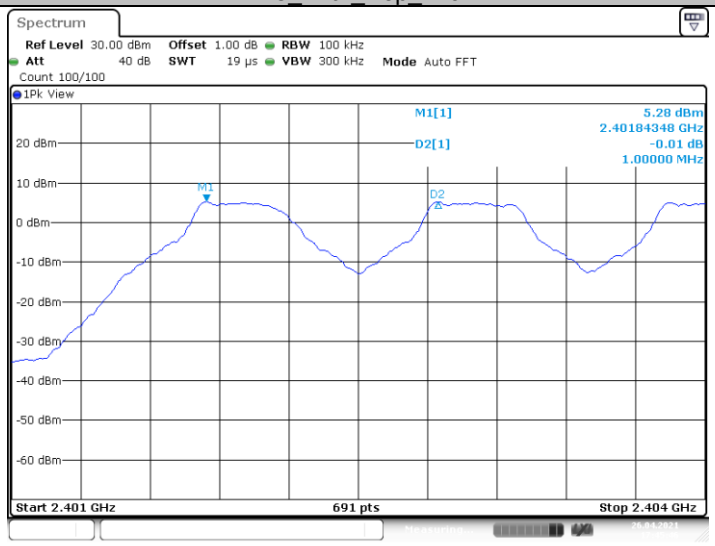
Test Mode

Please refer to the clause 2.4.

Test Result

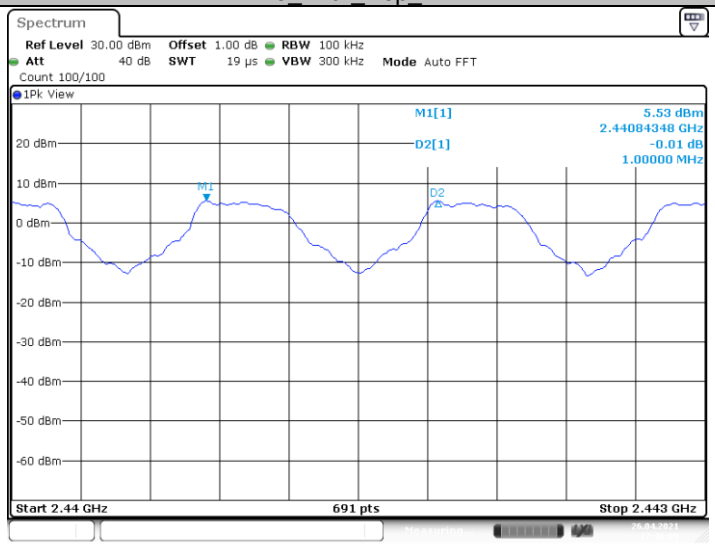
Test Mode	Frequency(MHz)	Result[MHz]	Limit[MHz]	Verdict
GFSK	Hop_2402	1.000	≥0.632	PASS
	Hop_2441	1.000	≥0.634	PASS
	Hop_2480	1.004	≥0.660	PASS
π /4-DQPSK	Hop_2402	1.148	≥0.848	PASS
	Hop_2441	0.996	≥0.848	PASS
	Hop_2480	1.000	≥0.850	PASS
8-DPSK	Hop_2402	1.000	≥0.850	PASS
	Hop_2441	1.000	≥0.846	PASS
	Hop_2480	1.000	≥0.846	PASS

DH5_Ant1_Hop_2402



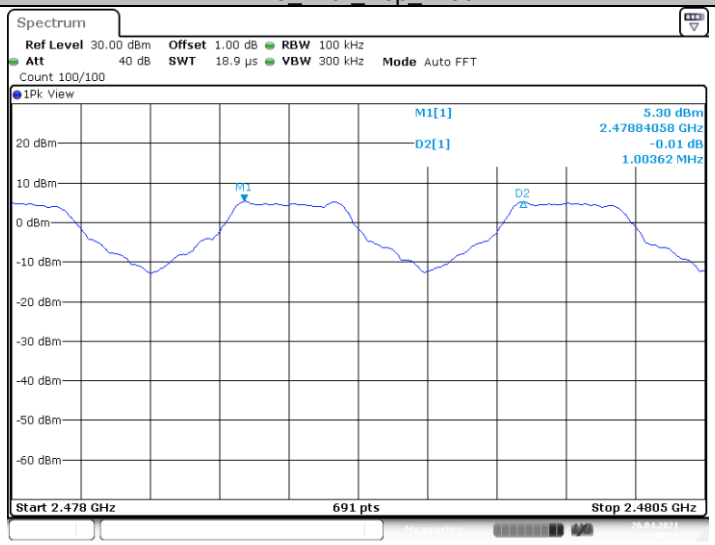
Date: 26.APR.2021 17:45:46

DH5_Ant1_Hop_2441



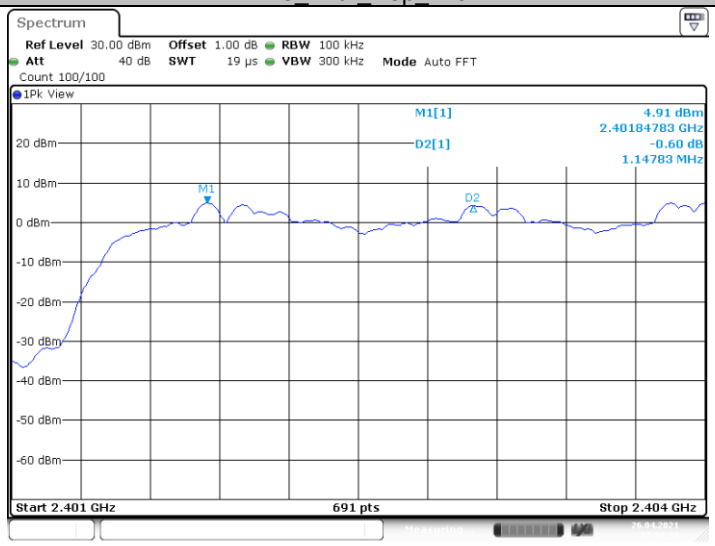
Date: 26.APR.2021 17:46:10

DH5_Ant1_Hop_2480



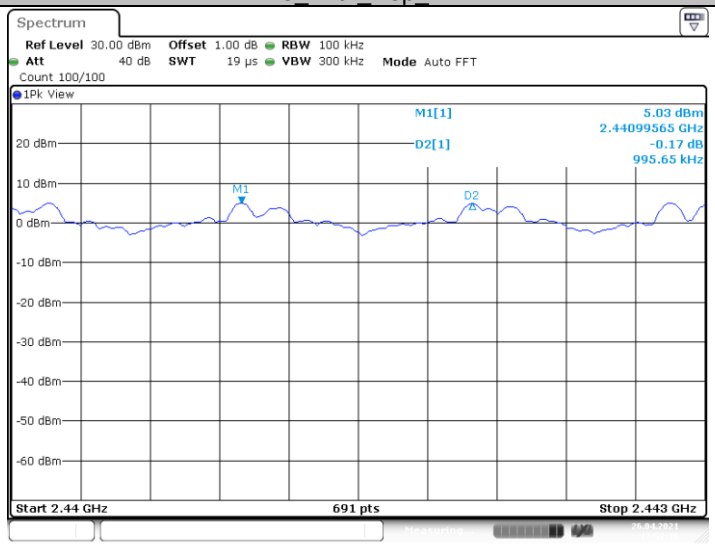
Date: 26.APR.2021 17:46:55

2DH5_Ant1_Hop_2402



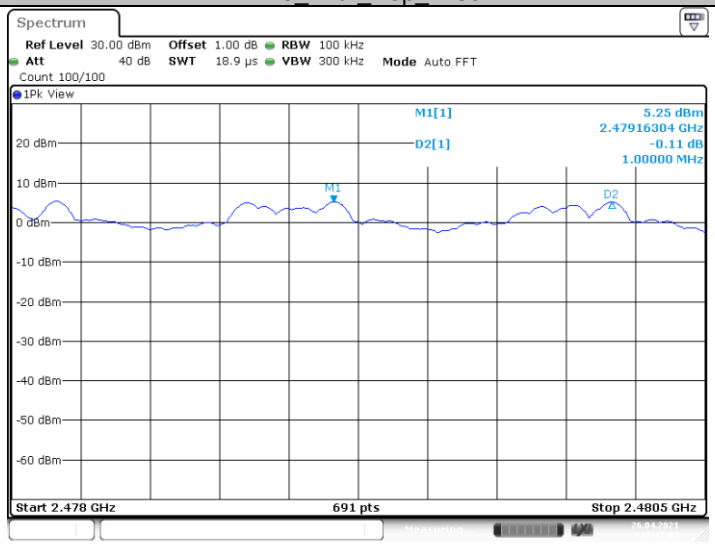
Date: 26.APR.2021 17:51:35

2DH5_Ant1_Hop_2441



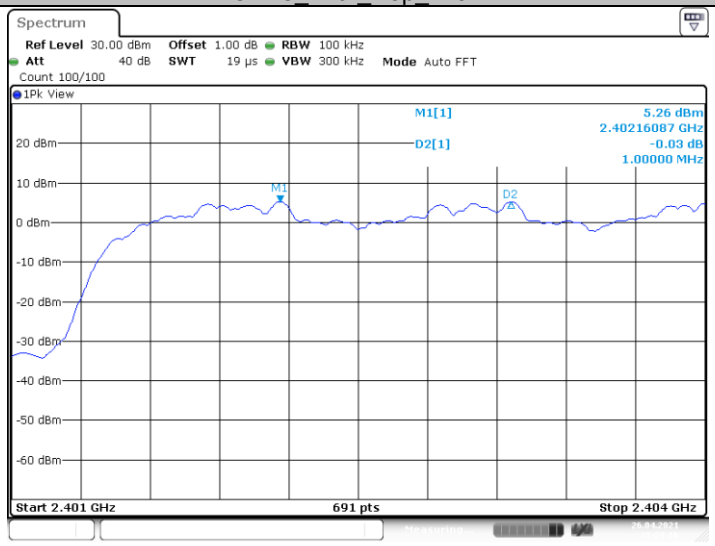
Date: 26.APR.2021 17:52:16

2DH5_Ant1_Hop_2480



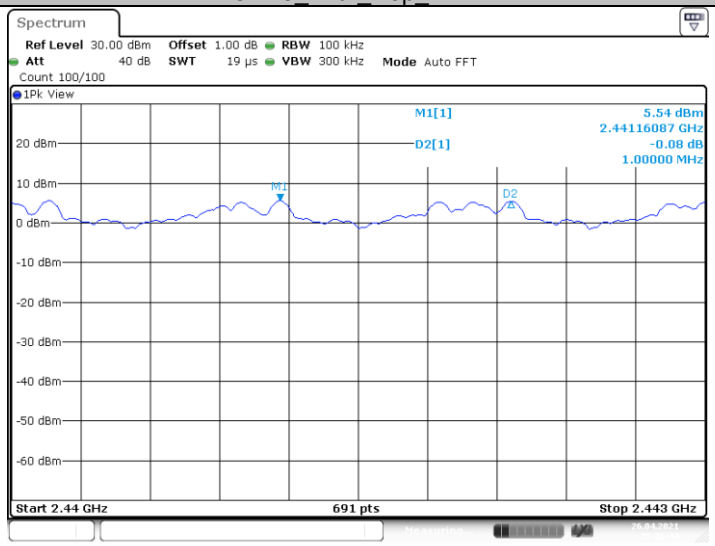
Date: 26.APR.2021 18:47:02

3DH5_Ant1_Hop_2402



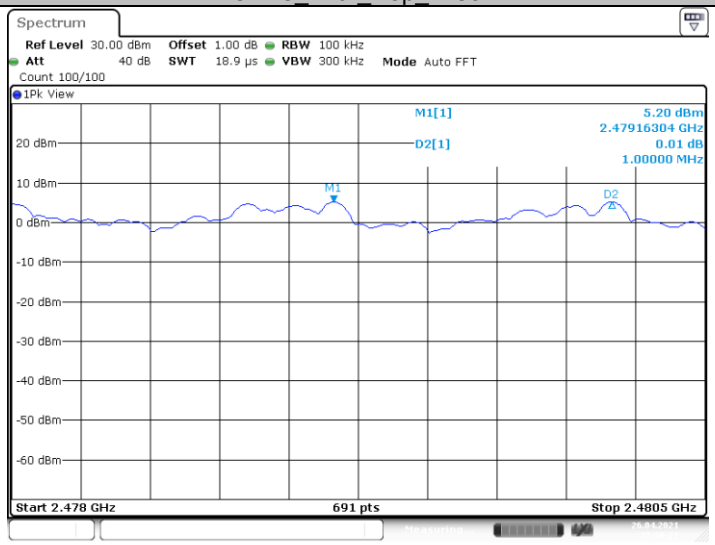
Date: 26.APR.2021 18:23:16

3DH5_Ant1_Hop_2441



Date: 26.APR.2021 18:26:44

3DH5_Ant1_Hop_2480



Date: 26.APR.2021 18:36:21

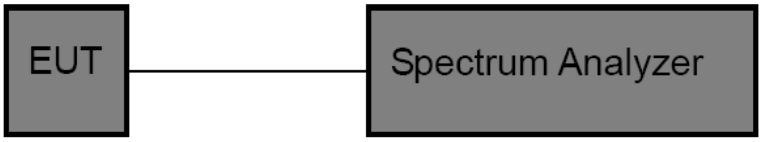
3.7. Number of Hopping Channel

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)/ RSS-247 5.1 d:

Section	Test Item	Limit
15.247 (a)(iii)/ RSS-247 5.1 d:	Number of Hopping Channel	>15

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Peak Detector: RBW=100 kHz, VBW⩾RBW, Sweep time= Auto.

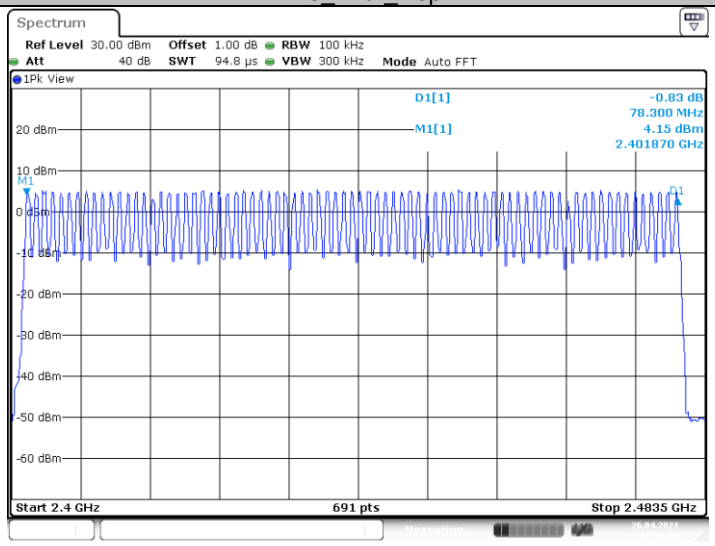
Test Mode

Please refer to the clause 2.4.

Test Result

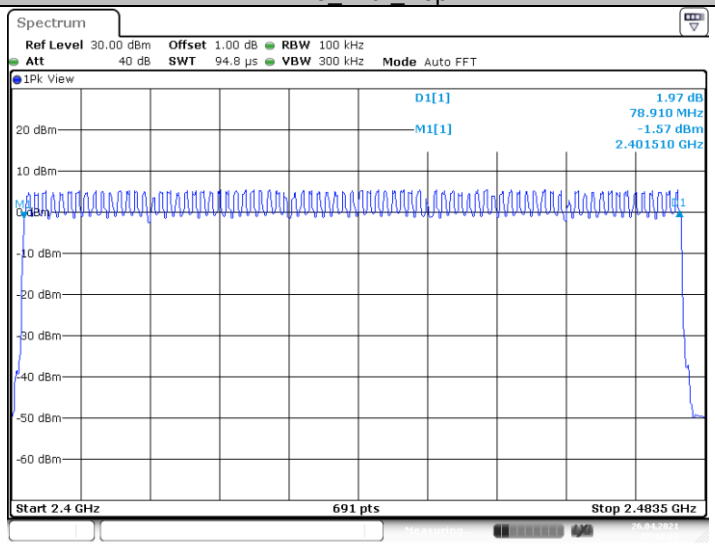
Modulation type	Channel number	Limit	Result
GFSK	79	≥15.00	Pass
π /4-DQPSK	79		
8DPSK	79		

DH5_Ant1_Hop



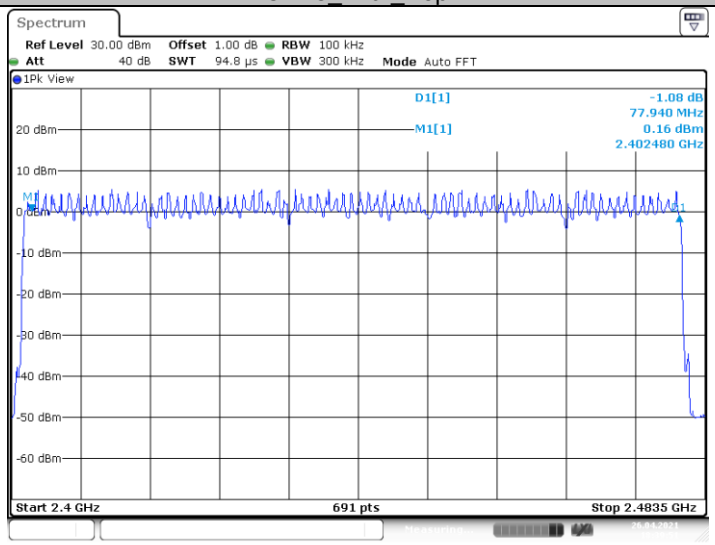
Date: 26.APR.2021 17:47:59

2DH5_Ant1_Hop



Date: 26.APR.2021 18:18:23

3DH5_Ant1_Hop



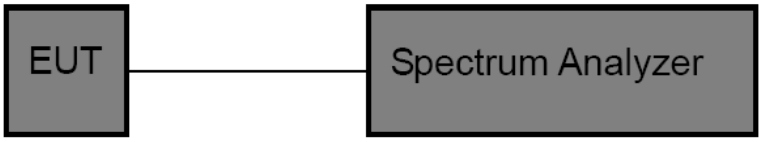
Date: 26.APR.2021 18:39:50

3.8. Dwell Time

Limit

Section	Test Item	Limit
15.247(a)(iii)/ RSS-247 5.1 d	Average Time of Occupancy	0.4 sec

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Spectrum Setting: RBW=1MHz, VBW⩾RBW.
   (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
   (3) Sweep Time is more than once pulse time.
   (4) Set the center frequency on any frequency would be measure and set the frequency span to zero.
   (5) Measure the maximum time duration of one single pulse.
   (6) Set the EUT for packet transmitting.

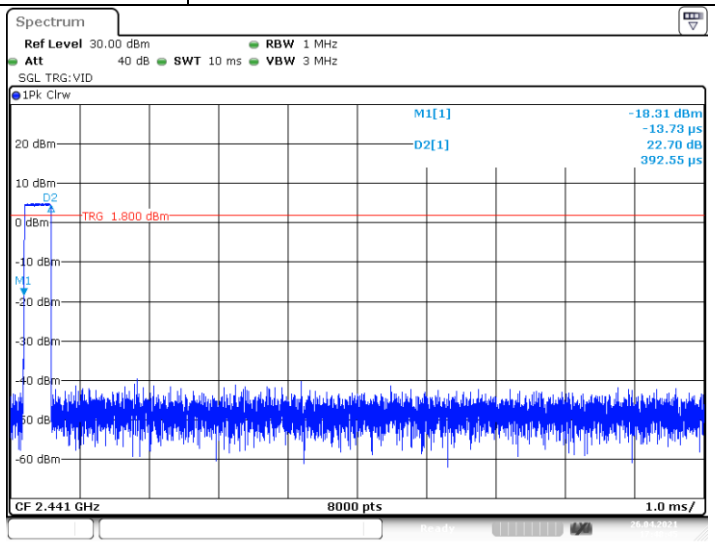
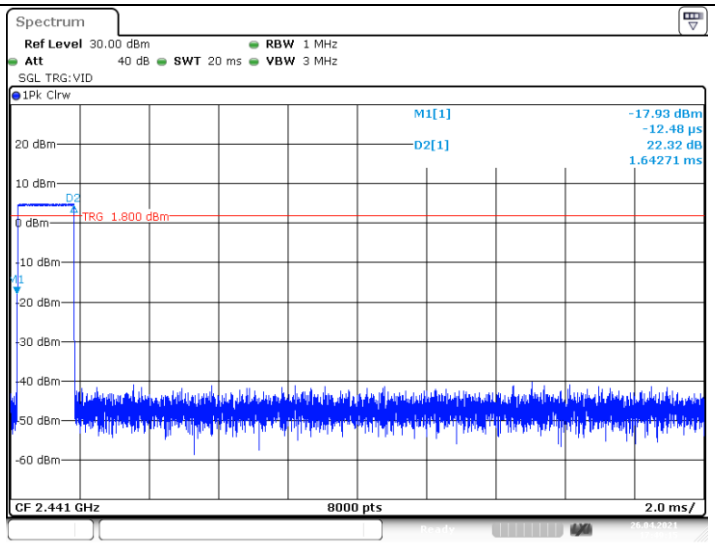
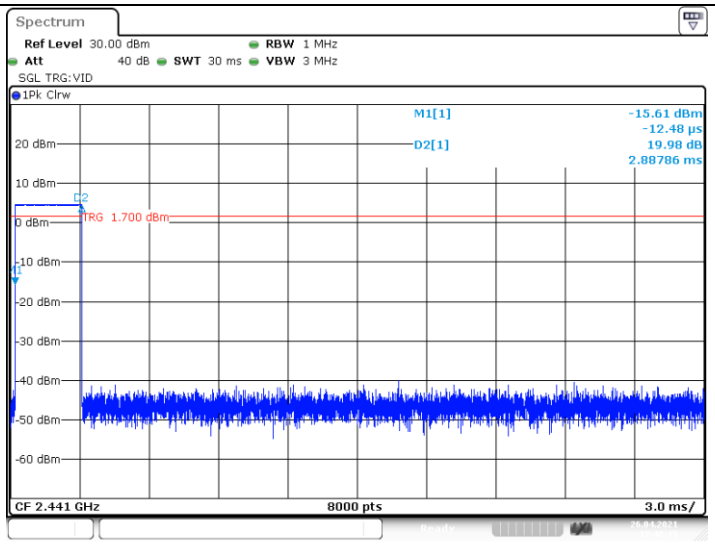
Test Mode

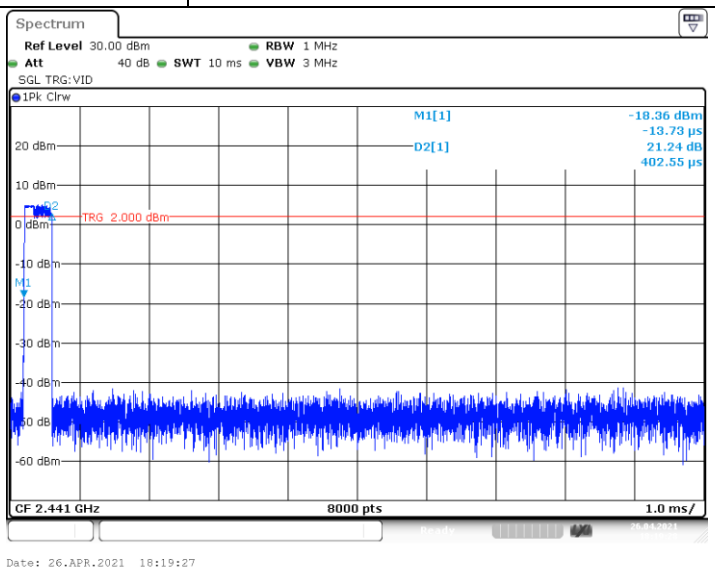
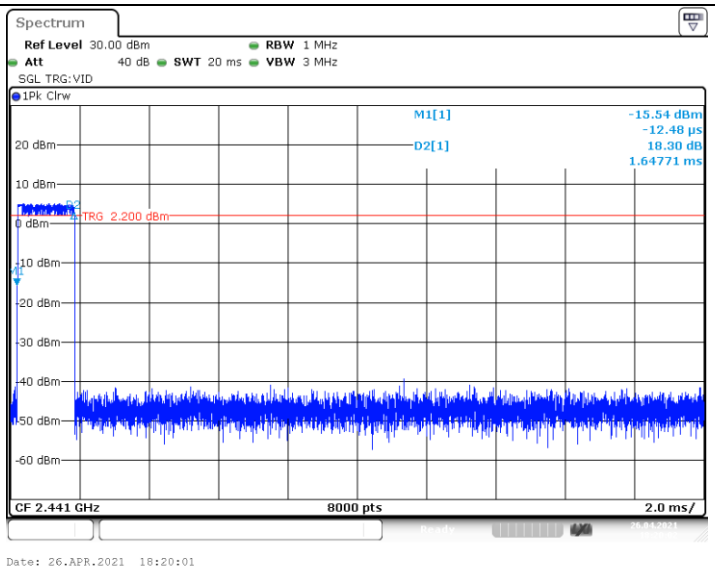
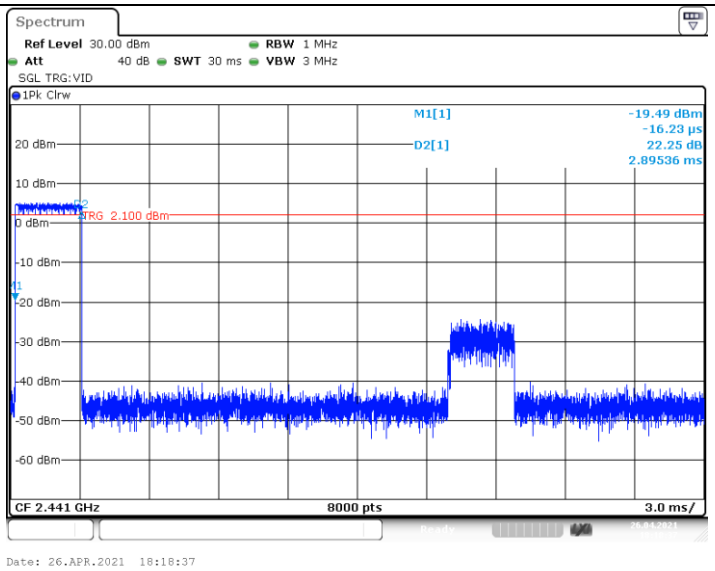
Please refer to the clause 2.4.

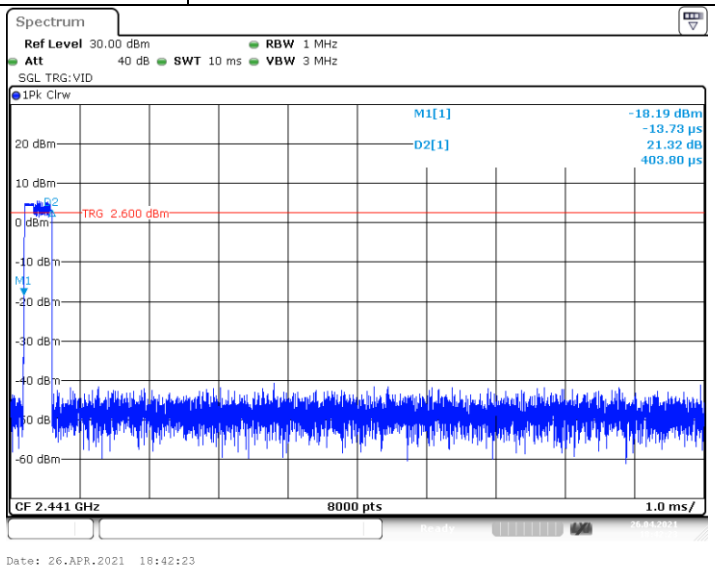
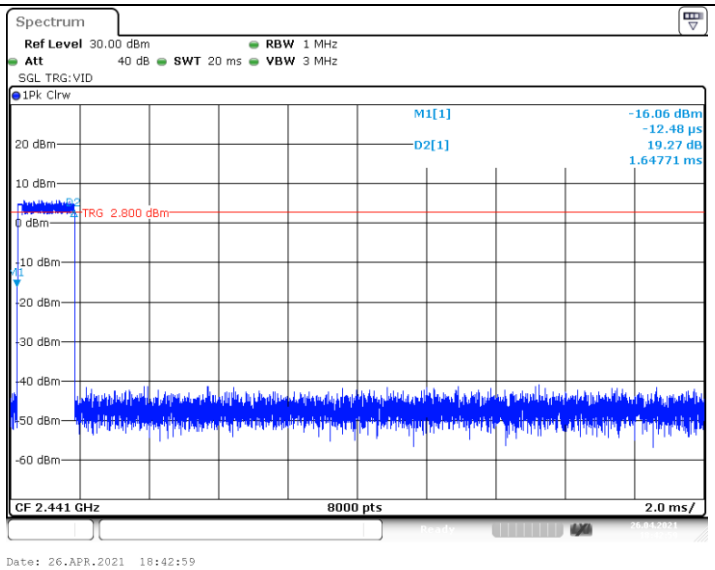
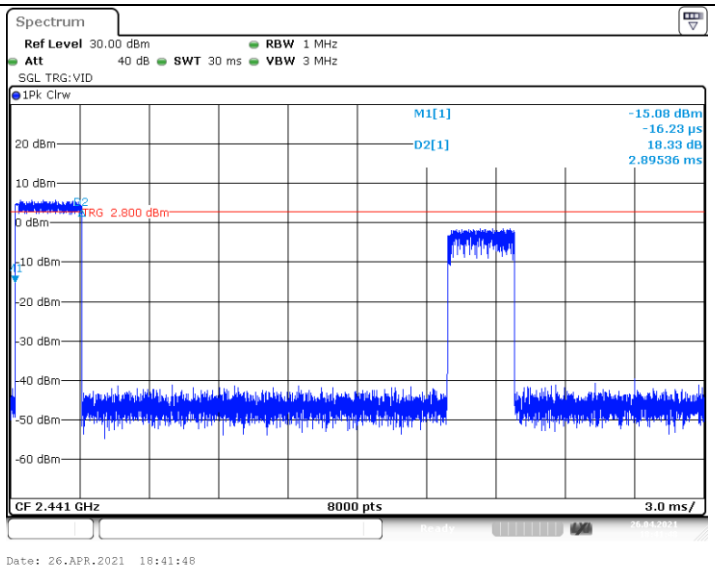
Test Result

Modulation type	Channel	Frequency (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (ms)	Limit (Second)	Result
GFSK	DH1	2441	0.39	124.80	31.60	≤ 0.40	Pass
	DH3	2441	1.64	262.40	31.60		
	DH5	2441	2.89	308.27	31.60		
π /4-DQPSK	2DH1	2441	0.40	128.00	31.60	≤ 0.40	Pass
	2DH3	2441	1.65	264.00	31.60		
	2DH5	2441	2.90	309.33	31.60		
8-DPSK	3DH1	2441	0.40	128.00	31.60	≤ 0.40	Pass
	3DH3	2441	1.65	264.00	31.60		
	3DH5	2441	2.90	309.33	31.60		

Note: 1DH1/2DH1/3DH1 Total of Dwell= Pulse Time(1600/2)*31.6/79*
1DH3/2DH3/3DH3 Total of Dwell= Pulse Time(1600/4)*31.6/79*
1DH5/2DH5/3DH5 Total of Dwell= Pulse Time(1600/6)*31.6/79*

Modulation Type:	GFSK
DH1	
DH3	
DH5	

Modulation Type:	π /4-DQPSK
2DH1	
2DH3	
2DH5	

Modulation Type:	8-DPSK
3DH1	
3DH3	
3DH5	

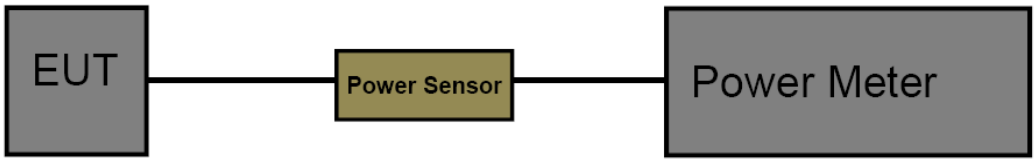
3.9. Peak Output Power

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1) / RSS-247 5.4 b:

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125mW(21dBm)	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the Power Meter and antenna output port as show in the block diagram above.
2. Read the power value in the test software and record it.

Test Mode

Please refer to the clause 2.4.

Test Result

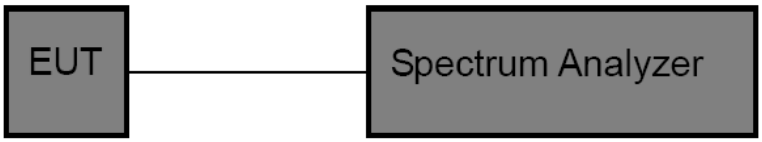
Test Mode	Frequency (MHz)	Result[dBm]	Limit[dBm]	Verdict
GFSK	2402	2.22	≤21	PASS
	2441	1.88	≤21	PASS
	2480	2.13	≤21	PASS
π /4-DQPSK	2402	2.14	≤21	PASS
	2441	1.90	≤21	PASS
	2480	2.25	≤21	PASS
8-DPSK	2402	2.01	≤21	PASS
	2441	1.84	≤21	PASS
	2480	1.96	≤21	PASS

3.10. Duty Cycle

Limit

None, for report purposes only.

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.
3. Spectrum Setting:

Set analyzer center frequency to test channel center frequency.
Set the span to 0Hz
Set the RBW to 10MHz
Set the VBW to 10MHz
Detector: Peak
Sweep time: Auto
Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

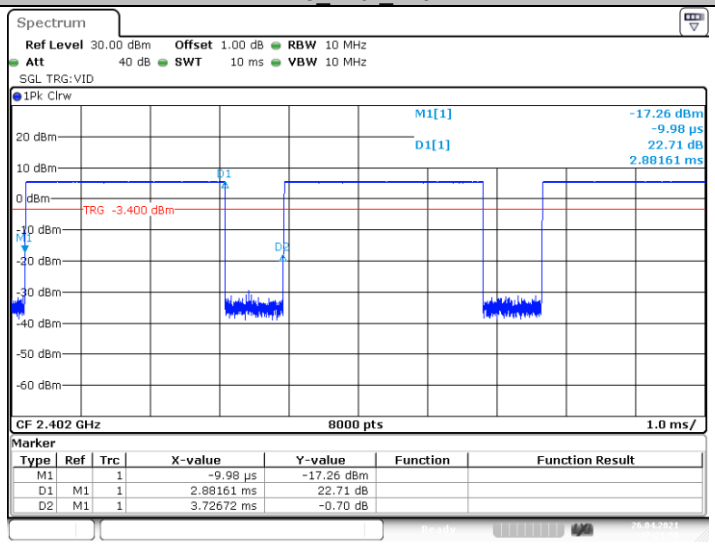
Test Mode

Please refer to the clause 2.4.

Test Result

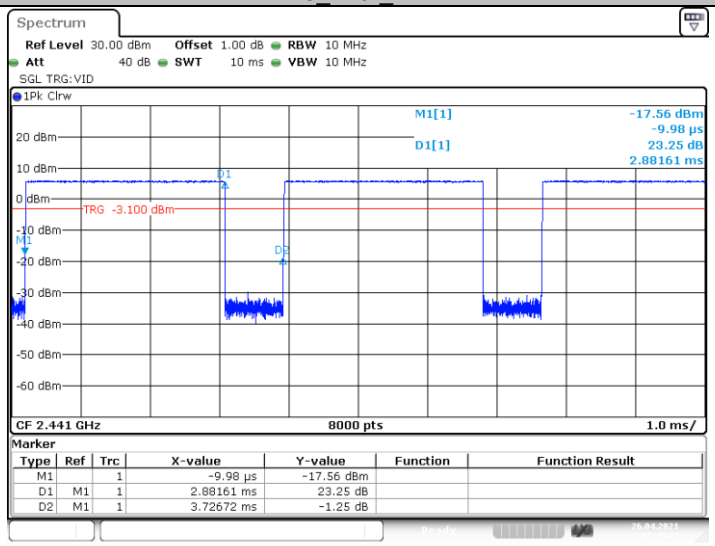
Test Mode	Frequency (MHz)	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
GFSK	2402	2.88	3.73	77.32	0.35	1
	2441	2.88	3.73	77.32	0.35	1
	2480	2.88	3.73	77.32	0.35	1
π /4-DQPSK	2402	2.89	3.73	77.46	0.35	1
	2441	2.89	3.73	77.46	0.35	1
	2480	2.89	3.73	77.46	0.35	1
8-DPSK	2402	2.89	3.73	77.53	0.35	1
	2441	2.89	3.73	77.52	0.35	1
	2480	2.89	3.73	77.53	0.35	1

DH5_Ant1_2402



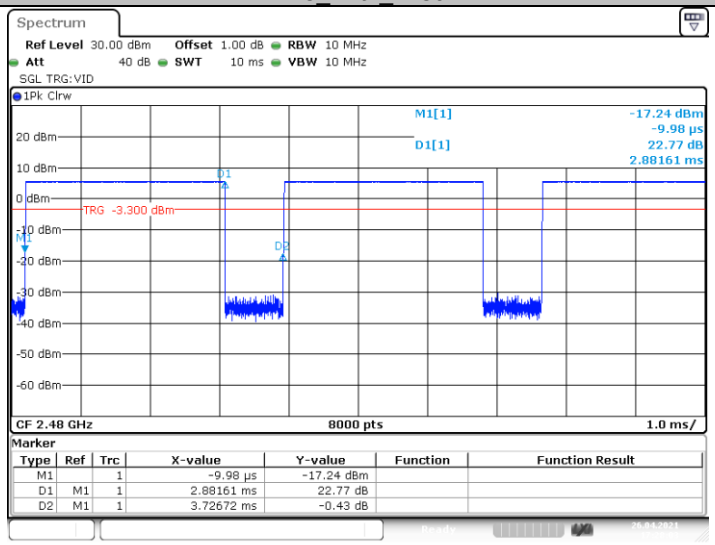
Date: 26.APR.2021 17:21:51

DH5_Ant1_2441



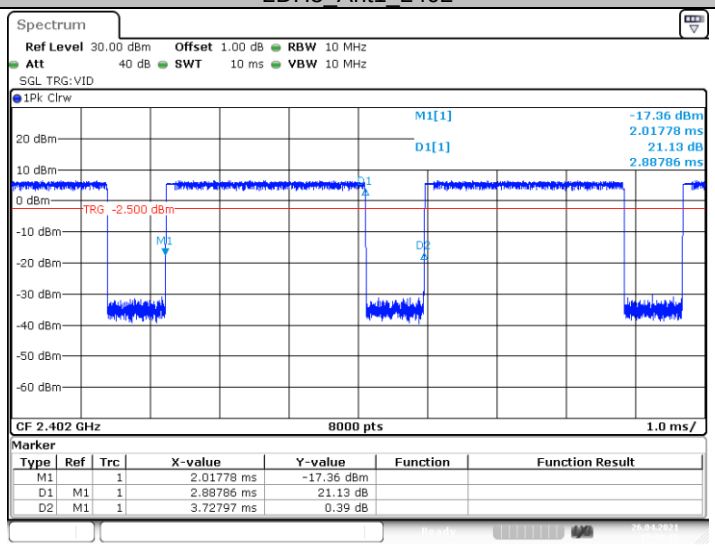
Date: 26.APR.2021 17:25:07

DH5_Ant1_2480



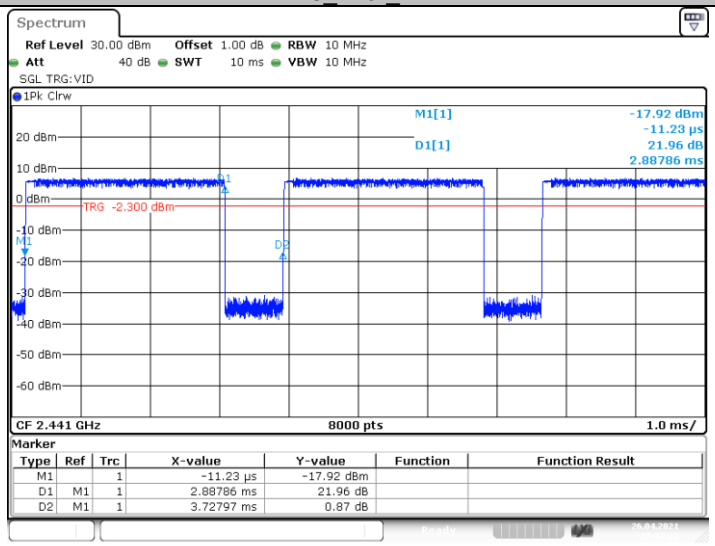
Date: 26.APR.2021 17:28:03

2DH5_Ant1_2402



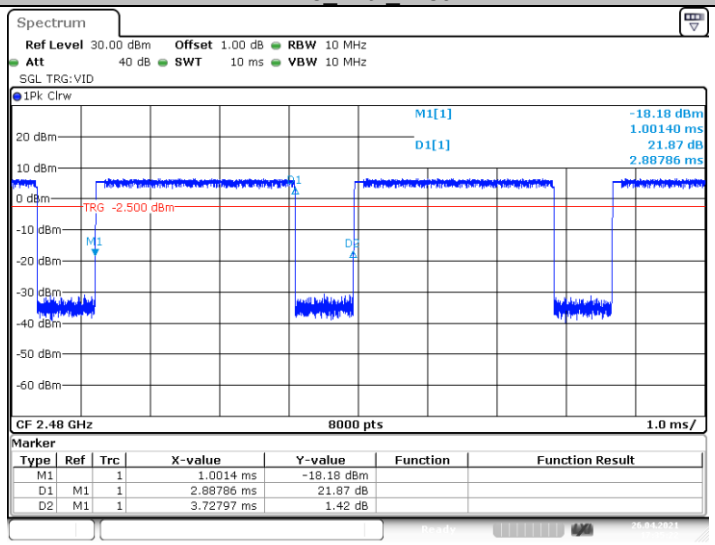
Date: 26.APR.2021 17:30:15

2DH5_Ant1_2441



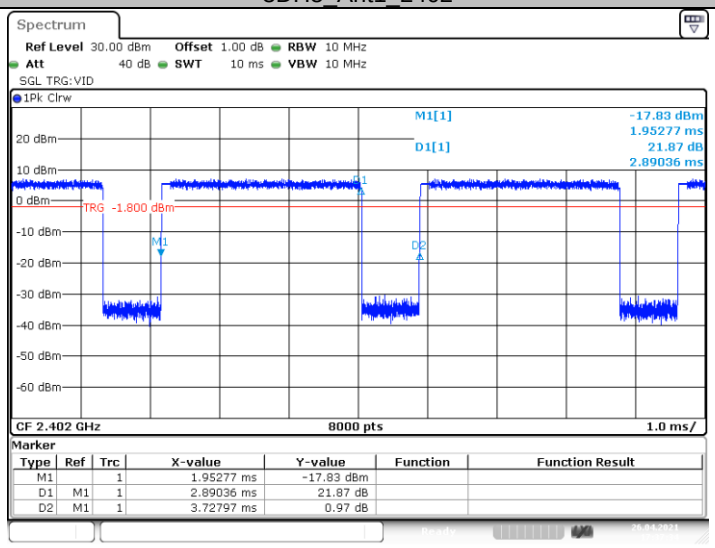
Date: 26.APR.2021 17:33:25

2DH5_Ant1_2480



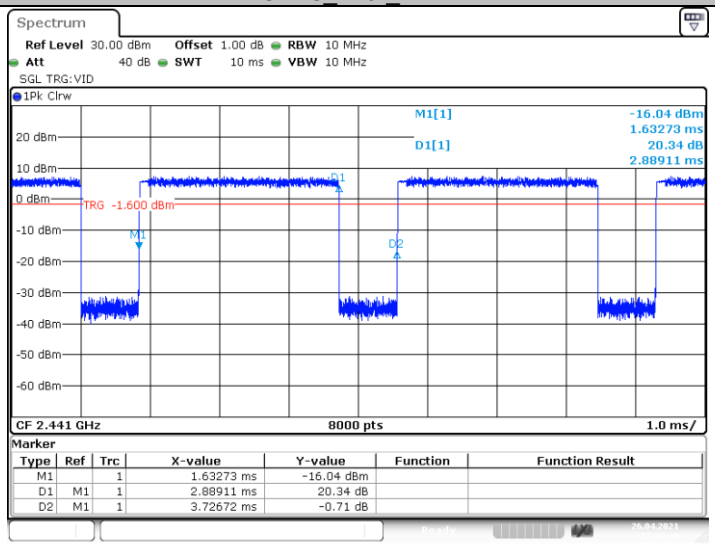
Date: 26.APR.2021 17:35:22

3DH5_Ant1_2402



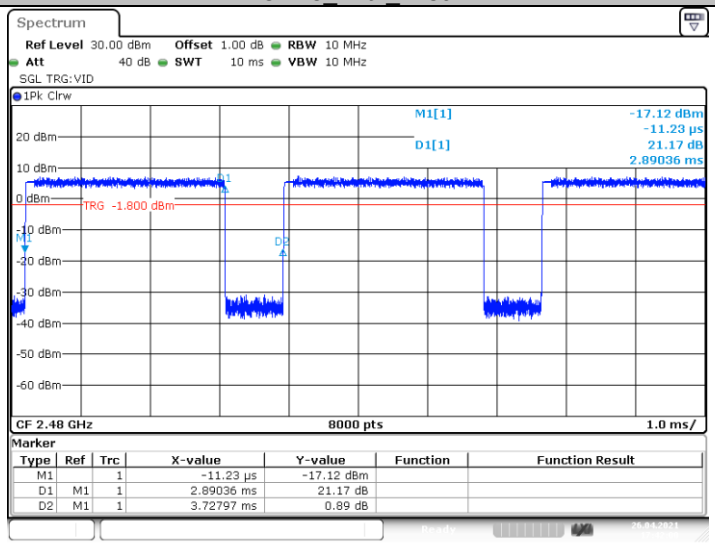
Date: 26.APR.2021 17:37:34

3DH5_Ant1_2441



Date: 26.APR.2021 17:39:50

3DH5_Ant1_2480



Date: 26.APR.2021 17:41:59

3.11. Antenna Requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

**********THE END**********